BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Diploma in Engineering Pearson BTEC International Level 3 Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 Extended Diploma in Engineering Pearson BTEC International Level 3 Extended Diploma in Electrical/Electronic Engineering
Unit number and title	**Unit 17: Power and Energy Electronics**
Learning aim(s)	**A:** Explore the construction and operation of common power electronic devices that are used to modify a form of electrical energy
Assignment title	Power Electronic Devices
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You are working as a final year apprentice technician for an engineering organisation that manufactures power electronic circuits for use in electrical products. Your job includes constructing circuits that make use of power electronic devices. Your supervisor is pleased with your work, and your general understanding of the circuits that you work with. Your supervisor has asked you to investigate a range of different types of power electronic device, to construct circuits for each type of power electronic device and demonstrate your understanding of semiconductor theory.
Task 1	You are going to evaluate the construction and operation of a range of power electronic devices. As part of your investigation you will need to safely build a circuit for each type of power electronic device and then compare experimental results with theoretical calculations. **To do this:** Your tutor will provide you with a range of power electronic devices that are used in switching circuits. You are to construct a range of electronic circuits to investigate the operation of different types of power electronic device. **You need to**: Use appropriate components and test equipment to investigate the following: • the voltage-current characteristics of PN junction diodes • configuration of, and switching characteristics of a bipolar junction transistor (BJT) • enhancement and depletion mode switching for metal oxide semiconductor transistor (MOSFET) • insulated gate bipolar transistor (IGBT) in switching circuits • semiconductor controlled rectifier (SCR) or thyristor in dc and ac circuits • triac switching and phase control.

	For each circuit you will need to take and record accurate measurements. **You then need to:** Produce a log book that shows evidence of your practical investigations into the use of power electronic devices in a range of circuits In your log book you should show evidence of: • the application of semiconductor theory • diagrams and explanations to accurately illustrate what materials are used in components, the physical construction of components and how these are reflected in the component circuit symbol. • A consideration of alternative materials that could be used for power electronic devices
Checklist of evidence required	A portfolio of evidence collating practical experiment reports exploring the operation of common power electronic devices in relation to device construction. To include observation records, images, theoretical data and calculations.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
17/A.D1	Evaluate, using language that is technically correct and of a high standard, the operation and switching behaviour of each type of power electronic device, comparing semiconductor theory and the results from safely conducted experiments.
17/A.M1	Build a circuit for each type of power electronic device safely and determine accurate operating characteristics of each.
17/A.M2	Analyse, using semiconductor theory and test results, the correct operation of each type of power electronic device.
17/A.P1	Build a circuit for each type of power electronic device safely and determine the operating characteristics of each.
27/A.P2	Explain, using semiconductor theory and test results, the correct operation of each type of power electronic device.

Sources of information to support you with this Assignment	Books Introduction to Power Electronics; Fewson, D.; Butterworth-Heinemann, 1998; ISBN 9780080535111 Power Electronics and Motor Control ; Shepherd, W et al; Cambridge University Press, 1995; ISBN 9780521478137 Discrete and Integrated Power Semiconductor Devices: Theory and Applications; Benda, V. et al; John Wiley & Sons, 1999; ISBN 9780471976448 Websites electronics-tutorials.ws allaboutcircuits.com Above are some examples of websites. Further useful resources may be found at http://qualifications.pearson.com/en/support/published-resources.html#step1
Other assessment materials attached to this	Circuit diagrams for each type of circuit that is to be investigated.

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